

Figure 1a

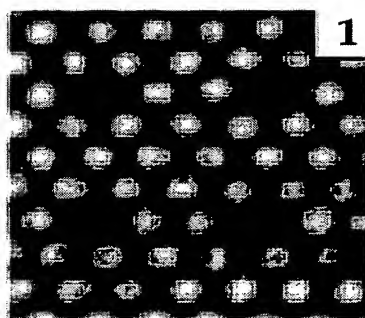


Figure 1b

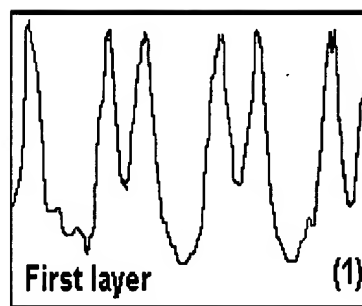


Figure 1c

10016133 121701

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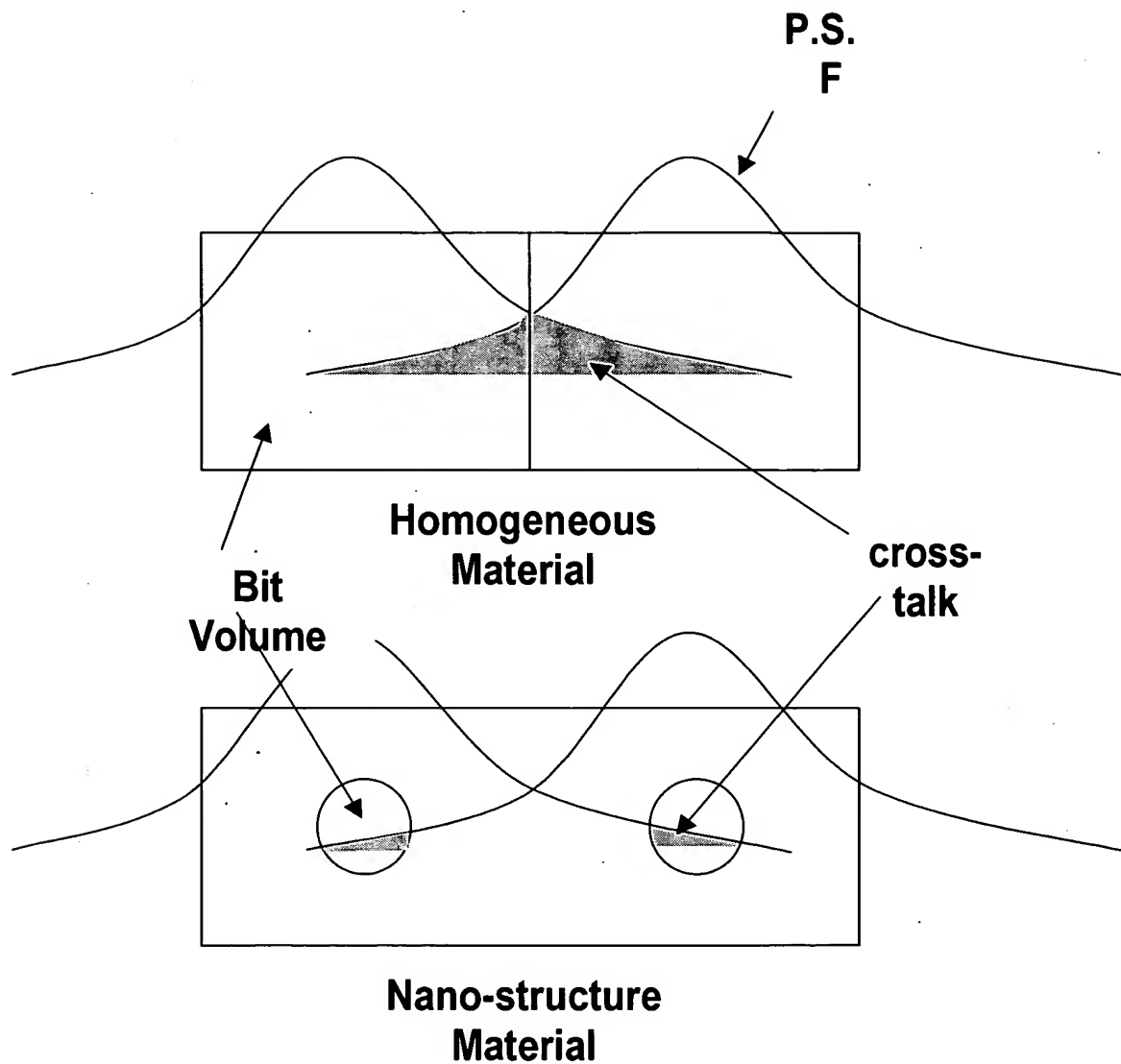


Figure 2. Nanostructured materials significantly reduce the cross-talk in the writing and reading processes by spatial isolation/separation of the active cores.

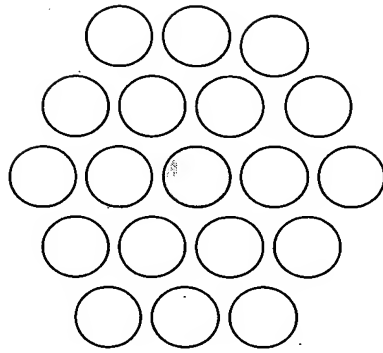


Figure 3a

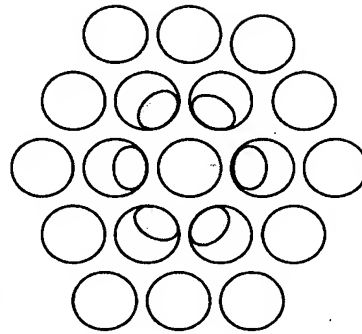


Figure 3 b (ii)

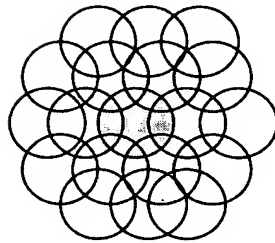


Figure 3b(i)

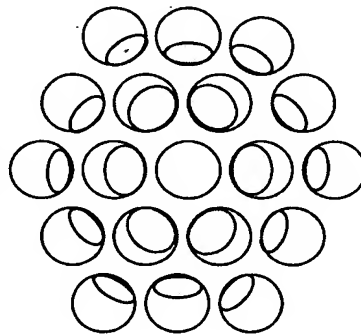


Fig 3c(ii)

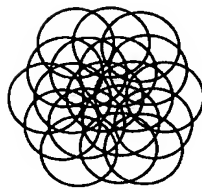


Fig 3c(i)

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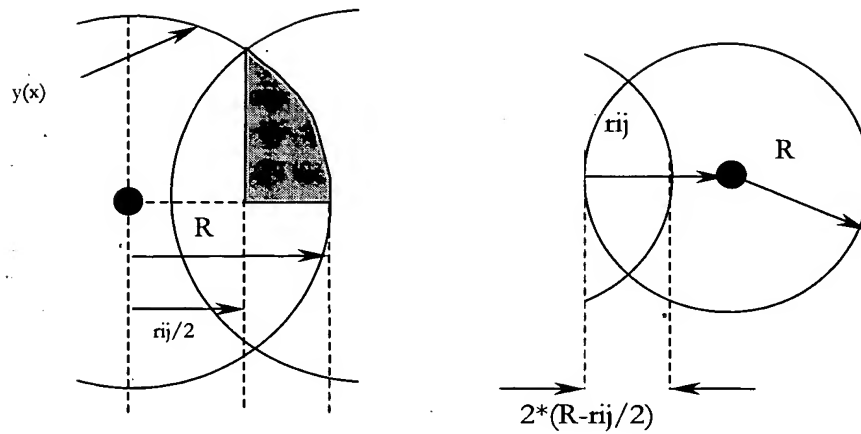


Figure 4a: Definitions of r , the spacing between the bits, and R , the radius of the diffraction pattern.

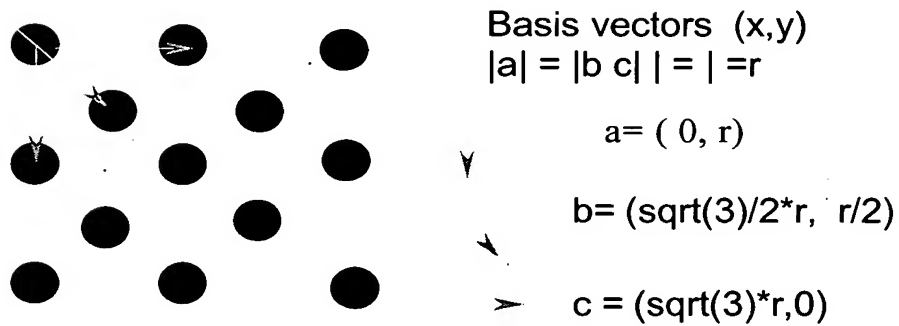


Figure 4b: Basis vectors and the Lattice Translations

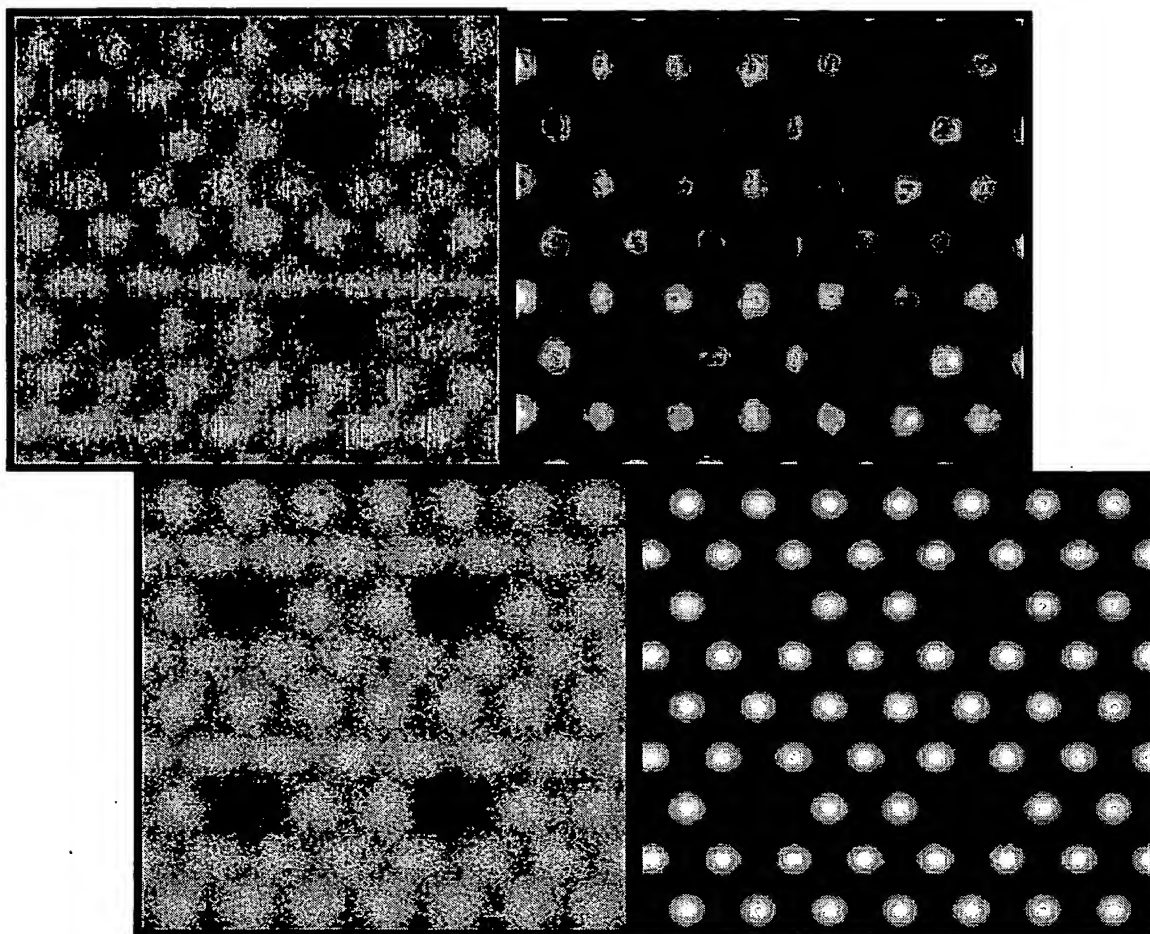


Figure 5 (top left) Laser confocal fluorescent microscopy image of nano-particle array.² The bits have core diameter 650 ± 20 nm and shell thickness 200 ± 5 nm . $\lambda_{\text{Fluorescence}} \sim 500$ nm, $\lambda_{\text{two-photon}} = 844$ nm. Resolution is approximately 256x256 samples. A data pattern has been photo-bleached into material **(top right)** After filtering and deconvolution approximate Gaussian point spread function. **(bottom right)** simulation of equivalent data with a sine squared basis bit **(bottom left)** with simulated point-spread function of diameter, 750nm and signal to noise ratio of 10.

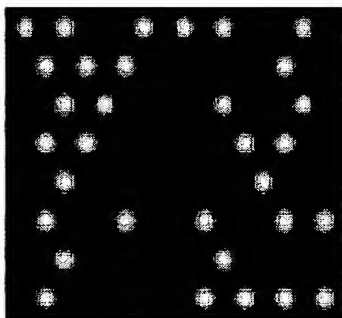


Figure 6a
 $r \sim \lambda$
 Overlap = 0%

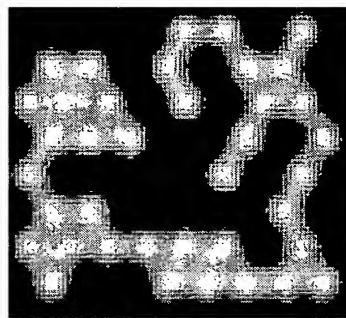


Figure 6b
 $r \sim \lambda/2$
 Overlap = 50%
 Rayleigh Limit

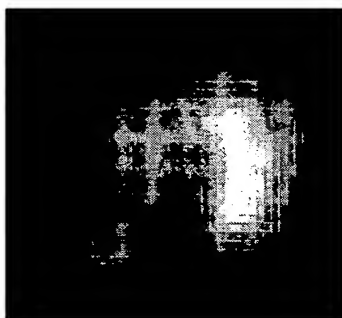


Figure 6c
 $r \sim \lambda/4$
 Overlap = 75%

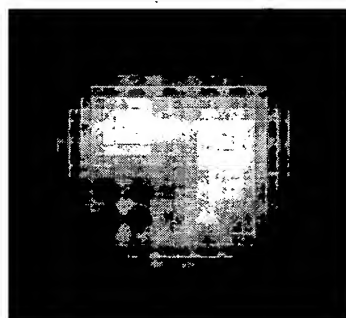


Figure 6d
 $r \sim \lambda/8$
 Overlap = 90%

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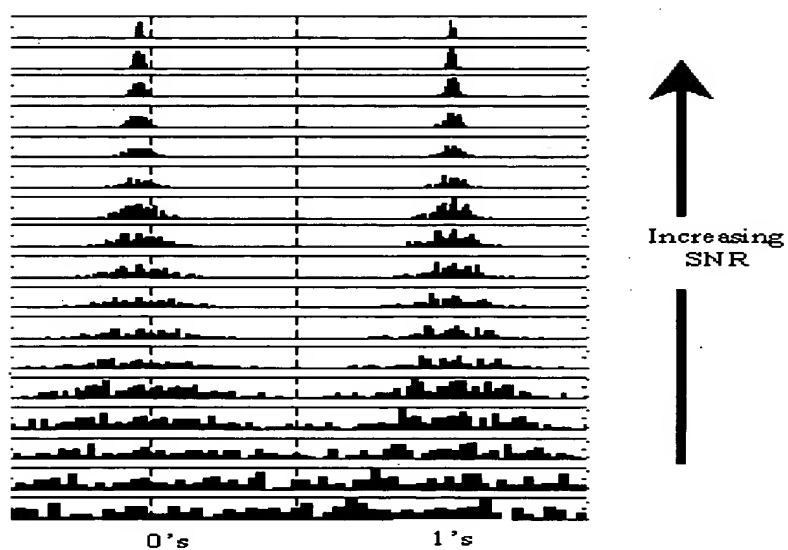


Figure 7: Bit distributions

Figure 8a

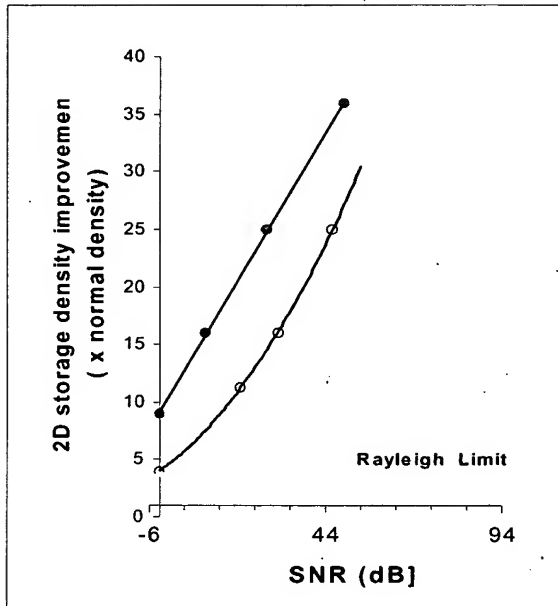


Figure 8b

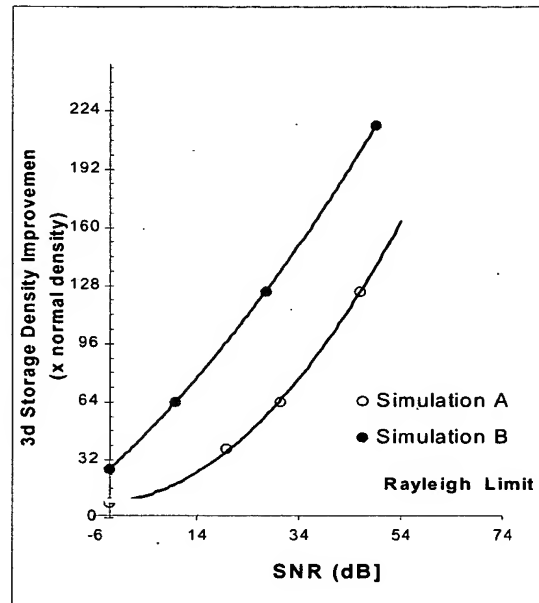
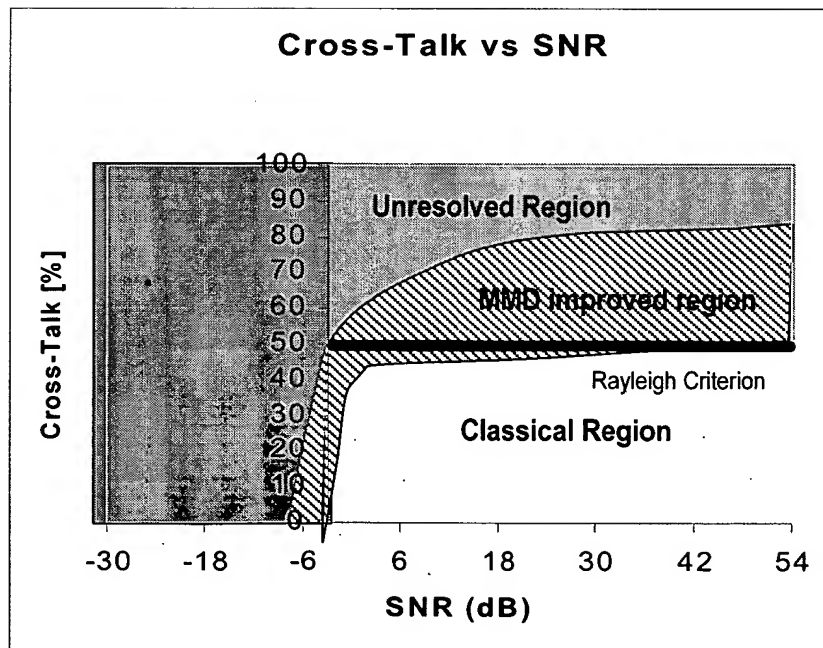


Figure 8c



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